

# Massachusetts Institute of Technology educator wows White Sands Test Facility audience

by Cheerie R. Patneau

At a joint dinner meeting of the White Sands Test Facility’s local chapters of the American Institute of Aeronautics and Astronautics (AIAA) and the National Management Association (NMA), MIT Associate Professor Dava J. Newman, Ph. D., spoke on her investigation of human movement and motor control performance across the spectrum of gravity. She spoke to an attentive audience about “Human Space Exploration from Mir to Mars,” where she highlighted astronaut activities on the space station, as well as preparations for a human mission to Mars.

In the audience were the Las Cruces and Mayfield High School teams that will fly on NASA’s KC 135A microgravity simulator aircraft. They will also be able to conduct experiments in microgravity, where the students will have about 20-25 seconds of experimenting each time the airplane achieves microgravity.

Because of their own interest in the skills and experiments that Dr. Newman had completed, the students were pleased to ask subject-related questions. Las Cruces High School student Stephen Smith asked, “if NASA studied John Glenn, then why isn’t NASA considering using younger subjects to study the effects of microgravity on humans?”

Newman replied that the bone loss experienced in deep space (between 10 - 40 percent of bone density) was considered permanent and therefore harmful. She is currently testing a gravity bed, where space travelers can sleep while combating the detrimental effects of weightlessness. Newman also gave the students some hard-won advice, “Don’t rush in to conduct your experiments, wait for microgravity, and take the drugs NASA offers you,” she

said alluding to the feeling of nausea experienced by microgravity flyers on the “Vomit Comet.”

Newman presented data on the largest case study of astronauts-cosmonauts in modern history. She has collected motor control movement on a whopping 20 astronauts-cosmonauts during the combined participation in the Mir Space Station, space shuttle flights, and the International Space Station. She reported that her study began with data from four astronauts, so the current pool of information is unprecedented. Newman collects data on all the movements her subjects make, including simple movements such as opening doors or more complex ones such as falling down.

Gail Bennett, NMA programs co-chair, was “impressed with Dr. Newman’s credibility. Obviously, she has worked with many cosmonauts and astronauts, and her work is very well-organized and researched. Local high school students, who will be flying on the KC-135 later this year, attended the meeting and couldn’t wait to talk to Dr. Newman about her experience on the aircraft. I particularly enjoyed the study about how the brain controls reflexes and muscles in zero gravity.”

Stephen McDougle, AIAA treasurer, said about the meeting, “Dr. Newman was very timely with her presentation, and after seeing the interaction with her audience, I can see why her students voted for her for the MacVicar Faculty Fellow Award, MIT’s highest honor for excellence in undergraduate education. Additionally, she interspersed her presentation with firsthand work experience with anecdotes about Glenn, Aldrin, or Russian cosmonauts. She is enthusiastic about her work, which she obviously enjoys.”

Moira Romansky, NMA member, said



Ken Schaaf, president, National Management Association; Dava Newman, Ph. D.; and Steve McDougle, treasurer, American Institute of Aeronautics and Astronautics, were among the attendees at the recent joint dinner meeting of the White Sands Test Facility’s local AIAA and NMA chapters. Newman, an associate professor at the Massachusetts Institute of Technology, spoke to attendees about her investigation of human movement and motor control performance across the spectrum of gravity.

she had “learned so much,” during the lecture. “What interested me the most was Dr. Newman’s research into spacesuits, where she considered the drastic temperature change from the toes to the torso and the torso to the head. I did not realize the temperature change was so great in such a short distance. I was equally impressed with her research with the flexibility and dexterity of the future suits. She loves her work and is impressive.”

Don Henderson, project leader, hypervelocity, at White Sands Test Facility, was also impressed with Newman’s work. He believes though that “a possible limit may exist on what the suits could do, if they were to be made from a more flexible material. The suits have to protect the astronauts from micrometeoroid and orbital debris. Each layer works much like a Kevlar® vest does for a policeman.” Henderson said that a MMOD’s velocity could range

from “10 to 20 kilometers per second with velocities doubling when two objects collide from opposite directions. With this kind of velocity, the astronauts need all the protection they can get, possibly at the risk of foregoing dexterity.”

White Sands Test Facility’s Honeywell Technology Solutions Inc. Program Manager Bob Baker thought Newman’s lecture “was an excellent opportunity for a local audience to see this kind of cutting-edge technology up close.”

White Sands Test Facility’s NASA Manager Joe Fries commented on “the insightfulness of the presentation, applicable for us here at the test facility. Dr. Newman reflects a bright future for NASA, with passion for her work.” Fries believes that “we must have vision like hers for big leaps in technology advancement.” He felt “fortunate in having AIAA bring in someone with credentials like Dr. Newman’s.” ■

## Employees earn Space Act Awards

*Last year, NASA Headquarters recognized the work of a number of JSC employees with Space Act monetary awards. The awards were presented during a ceremony Feb. 13. The following is a list of recipients.*

### TECH BRIEF AWARDS

- Todd J. Hinkel**  
**Richard J. Dean**  
**Scott C. Hacker**  
**Douglas W. Harrington**  
Remote Pneumatic Press System (\$150)
- Scott M. Lazaroff**  
**Arturo Vasquez**  
Self-Regulating Fuel Cell Pre-Humidification, Water Removal and Product Water Separation System (\$150)
- Patrick W. Fink**  
Improved Circularly Polarized Microstrip Antenna (\$150)
- Ed Lu**  
**Jean L. Chretien**  
Variable Shadow Screen for Optical Devices (\$150)
- Darby F. Magruder**  
Video Mosaicking for Pipe Inspection (\$150)
- Kriss J. Kennedy**  
TransHab Soft Stowage Array (\$150)
- Kriss J. Kennedy**  
TransHab Phase Two Layout: Configuration Concept (\$150)
- Chatwin A. Lansdowne**  
Scatter in Binomial Trials with Skewed Populations (\$150)
- Scott M. Smith**  
Determination of Ferritin-Iron by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) (\$150)
- Michael E. Fowler Jr.**  
Resin Transfer Molded Tool Face (\$350)
- Dennis R. Morrison**  
Cell Radiation Experiment System (\$350)

- Chris S. Lovchik**  
Compact Linear Drive (\$150)
- Chris S. Lovchik**  
Synthetic Bursa (\$350)
- J. David Jochim**  
**Chris S. Lovchik**  
Fully Magnetically Actuated Docking and Refueling Mechanism for Satellite Servicing (\$150)
- Larry W. Abbott**  
**Gary L. Cox**  
**Hai D. Nguyen**  
Universal Mini Controller (\$350)
- David J. Homan**  
**Charles J. Gott**  
Display Software Package for JSC Training Simulators (\$350)
- Todd J. Hinkel**  
**Richard J. Dean**  
**Scott C. Hacker**  
**Douglas W. Harrington**  
Hydraulic Loading Fixture (\$350)
- Todd J. Hinkel**  
**Carl W. Hohmann**  
**Richard J. Dean**  
**Scott C. Hacker**  
**Douglas Harrington**  
Pyrotechnic Resistance Welder (\$350)
- Robert O. Shelton**  
ROVer Ranch - An Online Robotics Workshop (\$350)
- Kathryn M. Hurlbert**  
Rack-Mountable Composite Coldplate Shelf (\$350)

- William C. Schneider**  
**James P. Locke**  
Deceleration Limiting Safety Crash Wall (\$350)
- J. David Jochim**  
Fail-Safe Electromagnetic Motor Brake (\$350)
- Carl D. Scott**  
Visual Control of Arc Process for Carbon Nanotube Production (\$350)
- Carl D. Scott**  
Automatic Control of Arc Process Production of Carbon Nanotubes (\$350)
- Chi-Min Chang**  
**Dominic L. Del Rosso**  
Double Acting and Locking Carabiner (\$350)

### PATENT APPLICATION AWARDS

- David A. Wolf**  
**Thomas J. Goodwin**  
Growth Stimulation of Biological Cells and Tissue by Electromagnetic Fields and Uses Thereof (\$350)
- Robert L. Shuler Jr.**  
Method and Apparatus for Reducing the Vulnerability of Latches to Single Event Upsets (\$500)
- Phong H. Ngo**  
**G. Dickey Arndt**  
Microwave Medical Treatment Apparatus and Method (\$350)
- William C. Schneider**  
**James P. Locke**  
**Horacio M. De La Fuente**  
Portable Hyperbaric Chamber (\$350)

- Patrick W. Fink**  
Improved Microstrip Patch Antenna and Method (\$500)
- James L. Lewis**  
Androgynous, Reconfigurable Closed Loop Feedback Controlled Low Impact Docking System with Load Sensing Electromagnetic Capture Ring (\$350)
- Franklin R. Chang-Diaz**  
Variable Specific Impulse Magnetoplasma Rocket Engine (\$500)
- Michael K. Ewert**  
Solar-Powered Refrigeration System (\$350)

### SPACE ACT BOARD AWARDS

- Scott M. Smith**  
A Food Frequency Questionnaire for Determination of Nutrient Intake During Extended-Duration Missions (\$300)
- Donald L. Henninger**  
**Douglas W. Ming**  
Slow Release Fertilizer: Active Synthetic Soil (\$400)
- Charles J. Gott**  
**David J. Homan**  
Display Software Package for JSC Training Simulators (\$1,500)
- Patrick M. O'Neill**  
**William X. Culpepper**  
**Gautam D. Badhwar**  
Radiation Susceptibility Assessment of NASA Flight Hardware Using High-Energy Protons (\$7,500)